

REMARKS

Claims 1-20 remain pending after amendment.

Claim Amendments

By this amendment, claim 1 is amended in a manner which is believed to more clearly define the claimed invention. No new matter is added by this amendment.

Interview with Examiner

Applicants thank the Examiner for the courtesy extended toward their representative during the interview of October 4, 2006. During the interview, those distinctions that exist between the prior art and the claimed invention were discussed. The Examiner also suggested various editorial revisions in the claims, which applicants have now generally adopted by the above amendments to claim 1. For instance, the Examiner questioned whether the claimed relationship permitted the composition to be comprised solely of silica particles of a size within the range of 40-45 nm. Applicants believe that the previous claim is clear on this point – i.e., the composition would not be comprised exclusively of silica particles within that size range. However, in an attempt to clarify the claims on this point, claim 1 is amended to state that “the silica particles have a size distribution ***wherein silica particles having a size less than 40 nm are present in said composition***”. Claim 1 as amended is thus believed to negate the interpretation of the claim asserted by the Examiner. Support for this amendment resides at least in the exemplified compositions in applicants’ specification. No agreement was otherwise reached during the interview regarding the allowance of the claims.

Rejection under 35 USC 112 (paragraph two)

Claims 1-8 stand rejected under 35 USC 112 (paragraph two) as not distinctly claiming the invention. This rejection is respectfully traversed to the extent deemed to apply to the claims as amended.

In support of the rejection, the Examiner takes the position that the claims are indefinite because claim 1 “appears to be defining 2 separate and independent inventions, as is apparent from the independent formulas.”

Applicants disagree with the position of the Examiner, for reasons set forth in applicants’ previous responses.

However, in an attempt to expedite consideration of the pending claims, applicants amend claim 1 in a manner which is believed to overcome the rejection (i.e., by making reference to a single formula).

Claim 1 is also amended to provide applicable units for “R” and “V” as suggested by the Examiner during the interview. Further, it is noted that the Examiner is of the view that the recited formula is indefinite because the formula is non-dimensionless. As explained during the interview, and apparently accepted by the Examiner at that time, it is not applicants’ intent to provide an algebraic formula wherein the respective units must be consistent. As such, the recited formula is proper, and not properly objected to by the Examiner for the asserted reasons. In an attempt to render moot the Examiner’s question regarding this point, claim 1 is amended to define the desired relationship without reference to the previously-recited formula.

The rejection is thus believed to be moot, and should be withdrawn.

Applicants' Claimed Invention

Applicants' claimed invention is directed to a polishing composition for memory hard disk comprising water and silica particles, wherein the silica particles have a particle size distribution wherein silica particles having a size less than 40 nm are present in said composition, and in which a relationship of a particle size (R) in nm at a range of from 40 to 45 nm and a cumulative volume frequency % (V) in a graph of particle size-cumulative volume frequency obtained by plotting a cumulative volume frequency (%) of the silica particles counted from a small particle size side of particles less than 40 nm in size satisfy the relationship where the cumulative volume frequency (V) in % is determined to be greater than or equal to the sum of the particle size (R) in nm and 50, and wherein the particle size is determined by observation with a transmission electron microscope (TEM).

The above relationship (defined by the formula $V \geq R + 50$) over the range of 40 to 45 nm means that the cumulative volume frequencies are 90% or more (at a size of 40 nm) and 95% or more (at a size of 45 nm). In other words, the polishing particles expressed by the noted relationship include 5% or less of particles having the particle size of more than 45 nm so that particles of large size are substantially excluded from the composition. At a particle size of 40 nm, the composition will include only 10% or less of larger size particles.

The attached tables (Exhibit A) and graphs (Exhibit B) demonstrate the manner by which particle size distribution is determined according to the claimed invention. The claimed relationship is satisfied only in Case 1 among exemplified Cases 1-3. As only the diameter of the largest particles differs, the cumulative volume frequency in % changes largely at the particle sizes of 40 nm and 45 nm. Note that the largest particle size in Case 1 is 45 nm, the largest particle size in Case 2 is 50 nm, and the largest particle size in Case 3 is 60 nm.

Further, as shown in the table of Case 1, the particle sizes of most particles is less than 40 nm. That is, 87.8% of the particles are less than 40 nm, with particles which are 40 nm in size being only 5%. While the particle size composition of Cases 2 and 3 is similar to that of Case 1 with respect to particle sizes of less than 40 nm, the volume frequency of Cases 2 and 3 differs due to the presence of larger particles than in Case 1. That is, Cases 2 and 3 have a volume frequency at 45 nm of only 90.4% and 84.5%, respectively, which each fall below the minimum value for the claimed invention of 95% for that particle size.

The claimed invention is neither disclosed nor suggested by the prior art.

Rejections under 35 USC 103(a)

The Examiner has set forth four separate rejections of claims 1-8 under the provisions of 35 USC 103(a) over each of ***Koichi et al '175, JP '170, Ota et al '711, and Rostoker et al '194***.

These rejections are respectfully traversed to the extent deemed to apply to the claims as amended.

Legal Standard for Determining Obviousness

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Distinctions Over the Cited Art

JP '170

Although the cited reference teaches that D50 is 10-600 nm, the reference also describes that D50 is preferably 40-100 nm (paragraph [0015]). Also, paragraph [0024] describes that the content of silica particles having a particle size of 40 nm or smaller should be large. In the Examples, D50 is 58 nm (D10 is 45 nm), and the content of silica particles having a particle size of 45 nm or smaller is 10% or less. On the other hand, in the present invention, the volume frequency of silica particles having a particle size of 45 nm or smaller is 95% or greater.

The cited JP '170 reference thus fails to teach or suggest the claimed invention.

Koichi et al. '175

The particle size distribution on a volume basis (as claimed) cannot be determined by the particle size distribution on a number basis (as taught by the reference). The reference discloses a polishing composition containing silica particles of a middle particle size and those of a large particle size, which substantially contains no silica particles of a small particle size. The reference does not describe an example which contains silica particles having D10 of 45 nm or smaller, and the specification includes a description of “the percentage of 40 nm counted from a smaller size side on a number base in a cumulative particle size distribution is 25% or less . . . especially preferably 3% or less, from the viewpoint of reducing the amount of abrasive remaining on the polished substrate” (column 5, lines 27-33). Such a description would not only not motivate one skilled in the art to employ silica particles having a small particle size (i.e., particle sizes of 40 nm or less), but actually teaches away from such an embodiment.

It can accordingly be reasonably presumed the polishing compositions in the examples of the cited Koichi '175 reference would not meet the limitations of claim 1 of the present invention. While in the cited reference, the particle size distribution is defined on a number basis so that it cannot be directly compared with the particle size distribution in the present invention defined on volume basis, the lack of particles in the required size range confirms that the reference does not teach or suggest the claimed invention.

Ota et al '711

Ota et al discloses a polishing composition containing silica particles having a small particle size (5-15nm and/or 20-40 nm) and silica particles having a large particle size (80-120 nm) (embodiments 1 and 2), or a polishing composition containing silica particles having a small particle size (5-15 nm or 20-40 nm) and silica particles having a middle particle size (40-70 nm) (embodiment 3). The noted embodiments thus include silica particles having either a middle particle size (40-70 nm) or silica particles having a large particle size (80-120 nm).

By contrast, the claimed invention contains silica particles having a particle size of 40 nm at a cumulative volume frequency of 90% or more and silica particles having a particle size of 45 nm at a cumulative volume frequency of 95% or more, and which contains substantially no silica particles having middle and large particle sizes as taught by the reference.

As shown in the previously submitted Declaration, Examples α , β , γ , δ , ϵ , ζ , η , and θ of Ota et al are described in the present invention as Comparative Examples 1-5, and the difference in effect between the present invention and the cited reference is apparent from Table 2 of the specification.

As shown in Table 2 (see page 23), Examples 1-5 and 7-10 satisfying the definition of particle size distribution of the present invention show remarkable effects in reducing surface roughness in comparison with Comparative Examples 1 to 5. That is, the present invention exhibits excellent effects which cannot be expected by the cited Ota et al reference.

Further, in the cited Ota et al reference, the particle size distribution is defined on a number basis so that it cannot be directly compared with the particle size distribution in the present invention, which is defined on a volume basis. It is thus not obvious to find a specific particle size distribution necessary for exhibiting unexpected effects based on such an uncomparable particle size distribution as noted above. Accordingly, the particle size distribution of the present invention is not rendered obvious by Ota et al.

Rostoker et al

Rostoker et al discloses a method of polishing semiconductor substrates with alumina. The reference merely teaches that the alumina can be substituted with silica having a particle size of 10-100 nm. The reference is otherwise totally silent with respect to teaching any aspect of the claimed invention.

In view of the above, the respective rejections under 35 USC 103(a) are without basis, and should be withdrawn.

The application is now in condition for allowance, and an early indication of same is earnestly solicited.

Should the Examiner have any questions concerning the present reply, he is respectfully requested to contact the undersigned at the telephone number provided.

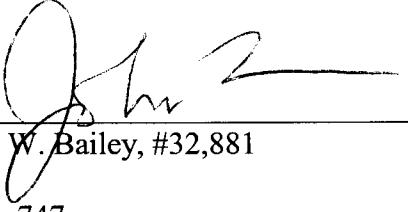
A check in the amount of \$120.00 is attached for the requested one month extension of time.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

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Respectfully submitted,

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JWB/JWH/ej

Attachments: Exhibit A and Exhibit B